

## **METHOD AND APPARATUS FOR DETERMINING CHARACTERISTICS OF MOS DEVICES**

### **Abstract of the Disclosure**

A set of ring oscillators is formed within a predetermined distance of each other. Each ring oscillator includes a number of coupled stages. The stages for a first given ring oscillator include an inverter having one or more first MOS devices having a first gate length. The stages for a second given ring oscillator include an inverter substantially identical to the inverters in the coupled stages of the first given ring oscillator and one or more second MOS devices having a second designed gate length. The stages for a third given ring oscillator comprise an inverter substantially identical to the inverters in the coupled stages of the first given ring oscillator and one or more third MOS devices having a third designed gate length. The second and third designed gate lengths are different and one of the second and third designed gate lengths is approximately equal to the first designed gate length. Performance is measured by using one of more of the given ring oscillators. The set of ring oscillators is used to determine one or more additional characteristics of MOS devices in the ring oscillators. A single test structure may be used to determine physical gate length ( $L_{poly}$ ), gate oxide thickness ( $T_{ox}$ ), gate capacitance ( $C$ ), effective gate resistance ( $R_{sw}$ ), gate tunneling current ( $I_g$ ), channel leakage current per unit width ( $I_c$ ), and active power ( $P$ ).